

What is claimed is:

1. A waveguide type light receiving element shared for a multiwavelength-band signal light, comprising:

a semi-insulating semiconductor substrate; and

an optical waveguide layer disposed over the semiconductor substrate, said optical waveguide layer being formed by sequentially laminating from the semiconductor substrate side, a first conductivity type first cladding layer connected to a first electrode, a first conductivity type first optical guide layer, an optical absorbing layer, a second conductivity type second optical guide layer, and a second conductivity type second cladding layer connected to a second electrode;

wherein when a center wavelength of a first signal light wavelength band corresponding to the shortest signal light wavelength band is defined as λ_1 , a center wavelength of a second signal light wavelength band is defined as λ_2 ($\lambda_2 > \lambda_1$), and a composition wavelength of a material for each of the first and second cladding layers is defined as λ_a ,

a composition wavelength λ_g of a material for each of the first and second optical guide layers satisfies $\lambda_a < \lambda_g < \lambda_1$ such that the first and second optical guide layers become transparent to the first signal light,

wherein when the thickness of each of the first and second optical guide layers, corresponding to an extreme value in which an inclination of a sensitivity curve of said λ_1 with respect to a change in the thickness of each of the first and second optical guide layers changes from positive to negative, is defined as d_1 , and

the thickness of each of the first and second optical guide layers, corresponding to an extreme value in which an inclination of a sensitivity curve of said λ_2 with respect to the change in the thickness of each of the first and second

optical guide layers changes from positive to negative, is defined as d_2 ,

the thickness d_g of the first and second optical guide layers satisfies $0.75d_1 \leq d_g \leq 1.25d_2$.

2. The waveguide type light receiving element according to claim 1, wherein when the thickness of the optical absorbing layer is defined as d_a , the thickness thereof satisfies $0.3\mu\text{m} \leq d_a \leq 0.5\mu\text{m}$.

3. The waveguide type light receiving element according to claim 1, wherein each of the first and second cladding layers is formed of InP, and a composition wavelength λ_g of a material for each of the first and second optical guide layers is fixed with composition wavelengths of the first and second cladding layers as $\lambda_a = 0.92\mu\text{m}$ and $\lambda_1 = 1.3\mu\text{m}$, and with $\lambda_2 = 1.55\mu\text{m}$, the thickness d_g of the first and second optical guide layers satisfies $0.3\mu\text{m} \leq d_g \leq 0.75\mu\text{m}$ with $d_1 = 0.4\mu\text{m}$ and $d_2 = 0.6\mu\text{m}$.

4. The waveguide type light receiving element according to claims 1, wherein each of the first and second optical guide layers is composed of an InGaAsP semiconductor material.

5. The waveguide type light receiving element according to claims 1, wherein each of the first and second optical guide layers is made up of an AlInGaAsP semiconductor material.

6. The waveguide type light receiving element according to claims 1, wherein each of the first and second optical guide layers is composed of a GaInNAs semiconductor material.

7. The waveguide type light receiving element according to claims 1, wherein a low refractive index layer composed of a material lower than the optical absorbing layer in refractive index is disposed on side faces of a waveguide.